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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/500,288	02/08/2000	Shinichi Nagahama	NICHIA-00800	2385
23117	7590	01/28/2004	EXAMINER	
NIXON & VANDERHYE, PC 1100 N GLEBE ROAD 8TH FLOOR ARLINGTON, VA 22201-4714			LOUIE, WAI SING	
			ART UNIT	PAPER NUMBER
			2814	

DATE MAILED: 01/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/500,288

Applicant(s)

NAGAHAMA ET AL.

Examiner

Wai-Sing Louie

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 November 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 17-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 17-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 17-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schetzina (US 6,046,464) in view of Koide (JP 11-145516) and Kern et al. (US 6,194,742).

With regard to claims 17 and 23-24, Schetzina discloses a Group III nitride light-emitting device (col. 9, line 46 to col. 22, line 43 and fig. 3) comprising:

- An n-type cladding layer 114b containing Al (col. 10, line 50 and fig. 3);
- An active layer 112 containing InGaN (col. 22, line 5 and fig. 3);
- A p-type cladding layer 114a containing Al (col. 10, line 50 and fig. 3);
- A GaN layer 124 having a sapphire substrate 132, but do not disclose a single-crystal GaN layer formed on the sapphire substrate 132, where the single-crystal GaN layer formed through a lateral-growth process defining the upper surface of the GaN layer. However, Koide discloses forming a GaN substrate and a GaN layer by lateral-growth method ([0007] to [0015]). Koide teaches the GaN semiconductor formed on a sapphire substrate would generate cracks due to a difference in thermal expansion coefficient ([0003]) and the lateral-growth could alleviate crack formation ([0005]). Therefore, it would have been obvious for the

one with ordinary skill in the art to modify Schetzina's device with the teaching of Koide to grow the GaN layer by lateral-growth in order to prevent cracks formation in the GaN layer;

- Schetzina discloses an $\text{Al}_{1-y}\text{Ga}_y\text{N}$ layer 122b formed directly on the upper surface of the GaN layer 124b and the $\text{Al}_{1-y}\text{Ga}_y\text{N}$ layer 122b has a mole fraction of $0 < a < 0.1$ (col. 10, line 53), but do not disclose has a coefficient of thermal expansion less than that of GaN substrate 22. However, Kern et al. disclose the coefficient of thermal expansion of GaN and AlN (see col. 2, table 1). By estimation, the coefficient of thermal expansion of $\text{Al}_a\text{Ga}_{1-a}\text{N}$ is about 4.45×10^{-6} /K, when $a=0.1$. The coefficient of thermal expansion of AlGaN layer is, therefore, less than GaN substrate thereby providing compression strain on the AlGaN crack-preventing layer (Kern col. 4, lines 29-32). Therefore, it would have been obvious for the one with ordinary skill in the art that the AlGaN layer 107 has a coefficient of thermal expansion less than that of GaN 105.

With regard to claim 18, Schetzina discloses the n-type cladding layer 122b contains Al, but do not disclose it contains more Al than the layer 114b. Since the applicant has not established the criticality of the Al concentration stated and since these concentrations are in common use in similar devices in the art, it would have been obvious to one of ordinary skill in the art to use these value in the device. Where patentability is said to be based upon particular chosen dimension or upon another variable recited in a claim, the applicant must show that the chosen dimensions are critical. *In re Woodruff*, 919 F2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

With regard to claims 19-20, Schetzina does not disclose the AlGa_N layer 122b has a thickness of 3-10 micron. However, the thickness is considered to involve routine optimization, which has been held to be within the level of ordinary skill in the art. As noted in *In re Aller*, the selection of reaction parameters such as the thickness etc. would have been obvious:

“Normally, it is to be expected that a change in temperature, or in thickness, or in time, would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art...such ranges are termed “critical ranges and the applicant has the burden of proving such criticality.... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.”

In re Aller 105 USPQ233, 255 (CCPA 1955). See also *In re Waite* 77 USPQ 586 (CCPA 1948); *In re Scherl* 70 USPQ 204 (CCPA 1946); *In re Irmischer* 66 USPQ 314 (CCPA 1945); *In re Norman* 66 USPQ 308 (CCPA 1945); *In re Swenson* 56 USPQ 372 (CCPA 1942); *In re Sola* 25 USPQ 433 (CCPA 1935); *In re Dreyfus* 24 USPQ 52 (CCPA 1934).

Therefore, one of ordinary skill in the requisite art at the time the invention was made would have used any thickness suitable to the method of the process in order to optimize the design.

With regard to claim 21, Schetzina discloses the AlGa_N layer 114c has been grown without an impurity doping (col. 21, lines 26-40 and fig. 29).

With regard to claim 22, Schetzina, modified by Kern et al. in claim 17 above, would disclose an InGa_N layer 112 is intervened between the AlGa_N layer and the n-type cladding layer (Kern col. 2, line 63 to col. 3, line 5 and fig. 3).

Response to Arguments

Applicant's arguments with respect to claims 7-22 have been considered but are moot in view of the new ground(s) of rejection with a different primary reference (Schetzina US 6,046,464).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

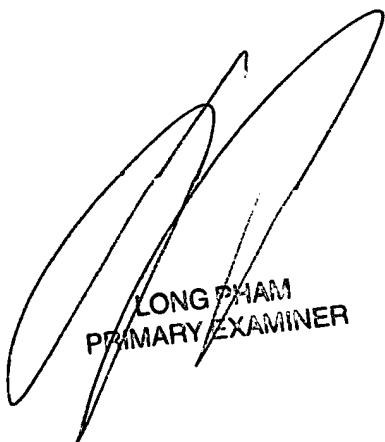
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wai-Sing Louie whose telephone number is (571) 272-1709. The examiner can normally be reached on 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 272-1562.

ws1
January 20, 2004


LONG PHAM
PRIMARY EXAMINER